in the number of tentacula, &c. is of little consequence, for I have seen, and have a long list of notes and numerous drawings of the strange changes, from the young to the adult state, of these lovely gems; at present I cannot spare the time to make the drawings and extend the notes.

Custom House, Wick, N. B., 9th Nov. 1855.

EXPLANATION OF PLATE VIII.

All very highly magnified.

A. A group of the animals on a piece of shell.
A, *a*. One with slender additional tips to the tentacles.
B. One of the animals more highly magnified.
Fig. 1. One of the Medusoids.
Fig. 2. Ditto when changing.
Fig. 2 *a*. Stomach and lips. 2 *b*. Upper part of umbrella.
Fig. 3. Under side, showing the arrangement of the tentacula, &c.
Fig. 4. Edge of mantle to show the canal, &c.
Fig. 5. One of the disks at the end of a tentacle.
Fig. 6. The stomach, mouth and lips.
Fig. 8. Upper part of the umbrella, showing the arrangement of the gastro-vascular canals.
Fig. 9. A tentacle to show the markings.
Figs. 10 & 11. The Medusoid changed and turned inside out.

XII.—*Brief Outline of the Anatomy of the genus* Atlas (*Lesueur*).

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[With a Plate.]

During our late cruises between Sydney and the islands of the Pacific, different species of Lesueur's curious genus *Atlas* were taken in the towing-net, and the following short anatomical account of them may prove interesting to the zoologist, more especially as—like *Phyllirrhoë*—their position in the animal kingdom has been so much a matter of doubt.

These little animals are of a rounded, oval, or elongated form, according to the amount of contraction of the longitudinal and circular muscular fasciculi; and they are usually between $\frac{1}{8}$th and $\frac{1}{10}$th of an inch in length.

Many of their movements resemble those of Annelida, particularly the manner in which they protrude and retract the head and proboscis. They frequently draw up their bodies into the form of a sphere, enabling them to resist a very considerable

pressure, or elongate themselves so as to assume a vermiform appearance. The specimens which I selected for examination were so continually undergoing those changes of form of which their pliant bodies were susceptible, that it was difficult to find them long enough in one position to portray them with much accuracy.

The proboscis is supported on a kind of neck, which presents a series of circular creases when partially retracted. The integument round the base of this neck forms an annular spreading fold, bearing on its free border a dense circlet of cilia so large as to be distinctly visible to the naked eye. Although these are the only organs available for swimming, the animals possess the power of rising or sinking in the water at will, without any apparent effort. The motion of the cilia is under voluntary control, and the undulations produced by their successive action proceed in a direction from left to right, with a precision and beauty of effect far surpassing those of the ciliated circlets of the Rotifera.

The species of *Atlas* creep upon their proboscis, which much resembles both in form and function the foot of a minute Gasteropod, but the mouth is situated on the inferior or creeping surface. The anterior lip especially expands so as to form a subquadrilateral locomotive disk; but behind the mouth a moderately long and bifid lobe projects in a backward direction, the hollow between the two divisions being richly ciliated.

The upper and fore part or frontal surface of the proboscis meets the creeping disk in front at an angle of about 45°. It is also subquadrilateral in form, presenting a number of rudimentary visual organs superiorly, couched in four small patches of black pigment-cells disposed in a transverse row, while on either side it is bounded by a linear elevation, which, together with the superior border, is clothed with large vibratile cilia.

The oral orifice when open is of a triangular shape, the base corresponding with the posterior lip, but when closed it appears like a simple transverse slit.

There are no dental organs in *Atlas*, but the lining membrane of the wide pharynx and œsophagus is thrown into numerous longitudinal folds, tinted with a deep purple pigment. The alimentary canal having formed an elongated gastric dilatation, takes a tortuous course towards the anus, which is situated at the anterior part of the dorsal region, some little distance behind the ciliated circle.

The liver is massive, minutely lobulated, and lined with secreting cells containing globules of a rich golden-yellow oil. The gland is in close relation with the intestine, and the passage of the biliary fluid into the latter is so free, that on the slightest pressure the stomach becomes distended with it.

The generative pit lies at the posterior extremity of the body, and may be retracted or protruded by the action of the longitudinal or circular muscular fibres of the integuments.

A large intestiniform tube commencing near the inferior part of the base of the proboscis takes a flexuous course backwards in close contact with the abdominal wall, and terminates in an elongated tapering and protrusile organ at the lower part of the generative pit.

On either side of the œsophagus a convoluted glandular tube, with a ciliated lining, gives rise to a long and narrow duct which passes directly backwards, and ends in a simple orifice lying superior and a little external to the male opening (?) As I have not been able to trace unequivocal spermatozoa or ova in any of these tubes, I am doubtful as to the actual function of the particular organs, but enough has been said to show that *Atlas* is bisexual.

The coverings of the body are composed of an external epithelium containing purple, brown, or green pigment-granules, and a muscular tunic consisting of an external longitudinal, and an internal circular or subspiral set of fibres. The former are disposed in fasciculi with intervals often exceeding their own breadth, but the latter form a continuous layer.

The interior of the body appears to be lined with vibratile cilia, by the agency of which minute globules may be seen coursing in a definite route through all the open spaces between the viscera. This would appear to be the only representative of a circulatory apparatus; and that of respiration is most probably combined with it, no heart, distinct blood-vessels or gills having been detected.

This genus would seem to be made up of gigantic Rotifers, in which the miniature outline, as it were, presented by the microscopic forms is filled up with a more complex internal organization in animals constructed on a much larger scale. It may be also mentioned, that they present characters which give them an intermediate position between the Bryozoa and Tunicata. There is no essential difference between the ciliated circle of *Atlas* and the circle of tentacula in a polype of *Bowerbankia* for example. Were the former produced at regular intervals into tentacular processes, *Atlas* would then only differ from a Bryozoon in those particulars which would naturally associate it with the Tunicata. On the other hand, it would appear to represent permanently the larval state of *Sipunculus* (see Max. Müller, Mull. Archiv, 1850, v.); and in fact it may be regarded as a common centre, connected, as it were, by radiating affinities with a circle of forms differing considerably amongst themselves.

Cuvier was unable to class the genus, from the ambiguity of

the account given of it; but De Blainville did not hesitate to place it under the head of *Akera*, conceiving that it was closely allied to *Gasteropteron*; and after his example, this error has been repeated in the able Monograph of the Bullidæ by Mr. Adams, published in the second volume of Sowerby's 'Thesaurus Conchyliorum,' a work which is yet in progress. The characters there given are as follow:—"Head with two small tentacular lobes. Body divided into two parts by a narrow pedicle. Foot dilated circularly and ciliated at the margin. Shell none." Now all these points may be reconciled with the actual state of the case by reference to the accompanying figures; but from what has been stated above, I think I may hazard the assertion that *Atlas* has nothing whatever to do with the Gasteropoda.

EXPLANATION OF PLATE IV.

Figs. 1–5 represent different views of a species of *Atlas* occurring very plentifully off the coast of New Caledonia.

Fig. 1. Front view, showing the aperture of the mouth, the foot-like anterior lip, the bilobed posterior lip, and the ciliated fold in a quiescent state.

Fig. 2. Posterior view, showing the eye-specks near the upper margin of the frontal aspect of the proboscis.

Fig. 3. A foreshortened view, with the ciliated circle in active motion: the arrows show the path of the undulations produced by the successive action of the cilia.

Fig. 4. A back view of the animal creeping on its labial disk, with the proboscis and ciliated band retracted. The dorsal position of the anus is also distinctly seen.

Fig. 5. A lateral view.

Fig. 6. A species of *Atlas* of a brilliant green colour, not so plentiful as the last, but occurring in the same localities: *a*, the constricted anterior extremity, the proboscis and ciliated band being retracted to the anus, *b*; *c*, the generative openings.

Fig. 7. Natural size.

Figs. 8, 9 & 10. Different stages in the eversion of the ciliated band.

Fig. 11. Diagrammatic figure of the animal, showing the relative anatomy of its internal organs: *a*, the wide pharynx; *b*, the liver; *c*, the intestine; *d*, the anus; *e*, a protrusile organ connected with the intestiniform tube *f*, noticed in the text. At the opposite extremity of this tube two small glandular-looking sacculi, *g*, are indicated; *h*, the small ducts of the lateral convoluted tubes.

Fig. 12. Natural size of the animal.

Fig. 13. Loop of one of the generative tubes (seen at 11 *h*) highly magnified, showing a deposit of dark pigment on one side.

Fig. 14. A few of the hepatic lobuli also highly magnified.

Port Curtis, Feb. 13, 1855.